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EXAMINER
AMARI, ALESSANDRO V

ART UNIT	PAPER NUMBER
2872	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/919,711	Applicant(s) BISCHEL ET AL.	
	Examiner Alessandro V. Amari	Art Unit 2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-24 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-6,10-15,17,18 and 22-24 is/are rejected.

7)☒ Claim(s) 7-9,16 and 19-21 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Double Patenting

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

2. Claims 1, 2 and 10 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 and 2 of U.S. Patent No. 6,434,318 in view of Sang-Shin Lee et al. "Variable Optical Attenuator based on a Cutoff Modulator with Tapered Waveguides in Polymers" Journal of Lightwave Technology, vol.17, no. 12.

Claims 1, 2 and 10 of the application and claims 1 and 2 teach an optical attenuator device operable in a non-actuated state and an actuated state comprising a waveguide, a thermal source for generating a temperature gradient wherein the optical energy is controlled by adjusting an electrical control signal applied to the thermal source. However, the patent does not teach that the waveguide has an intermediate section having reduced confinement of the optical energy relative to input section. Sang-Shin Lee et al does teach an intermediate section having reduced confinement of

the optical energy relative to input section of an optical attenuator (i.e., tapered waveguide) a shown in Figure 1. It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the intermediate section as taught by Sang-Shin Lee et al in the instant device in order to improve attenuation efficiency of the device.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-6, 10 and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Narayanan et al U.S. Patent 5,796,906.

In regard to claim 1, Narayanan et al discloses (see Figures 1, 2 and 6) an optical attenuator device selectively operable in a non-actuated state and an actuated state, comprising: a waveguide (5) for guiding optical energy, the waveguide having an input section coupled to an intermediate section (B in Figure 2), said intermediate section having reduced confinement of the optical energy relative to said input section; a thermal source (210), disposed above said intermediate section, for generating a temperature gradient within a portion of said intermediate section along a vertical axis

thereof when said device is in said actuated state, said temperature gradient being sufficient to alter a refractive index profile within said intermediate section such that a portion of said optical energy is deflected downwardly and extracted from said intermediate section.

Regarding claim 2, Narayanan et al discloses that said intermediate section of said waveguide comprises a core and a cladding bounding said core, said core and cladding having matched thermo-optic coefficients. Although the prior art does not specifically disclose the claimed core and cladding and that they have matched thermo-optic coefficients, this feature is seen to be an inherent teaching of that device since a waveguide necessarily includes a core and a cladding and it is apparent that they must have matched thermo-optic coefficients in order for the device to function as intended.

Regarding claim 3, Narayanan et al discloses that said core of said intermediate section has at least one transverse dimension that is significantly larger than a corresponding transverse dimension of a core of said input section as shown in Figure 2.

Regarding claim 4, Narayanan et al discloses that said intermediate section is coupled to said input section by an adiabatic taper as shown in Figure 2 and as described in column 10, lines 28-31.

Regarding claim 5, Narayanan et al discloses that said waveguide further comprises an output section optically coupled to said intermediate section, said output section having increased confinement of the optical energy relative to said intermediate section as shown in Figure 2.

Regarding claim 6, Narayanan et al discloses that said core is segmented (A, B, C) as shown in Figure 2.

Regarding claim 10, Narayanan et al discloses that said portion of said optical energy extracted from said intermediate section is adjusted by varying an electrical control signal applied to said thermal source as described in column 8, lines 64-67 and column 9, lines 1-12.

In regard to claim 12, Narayanan et al discloses (see Figures 1, 2 and 6) a method for controllably removing optical energy from a waveguide, comprising the steps of: (a) directing said optical energy from an input section of said waveguide to an intermediate section (B in Figure 2) of said waveguide, said intermediate section having reduced confinement of said optical energy relative to said input section; and (b) generating a vertical temperature gradient (210) within said intermediate section sufficient to alter a refractive index profile within said intermediate section such that a portion of said optical energy is deflected downwardly and extracted from said intermediate section as described in column 8, lines 64-67 and column 9, lines 1-12.

5. Claims 1-6, 10-12 are rejected under 35 U.S.C. 102(b) as being anticipated by Sang-Shin Lee et al. "Variable Optical Attenuator based on a Cutoff Modulator with Tapered Waveguides in Polymers".

In regard to claim 1, Lee et al discloses (see Figures 1, 2) an optical attenuator device selectively operable in a non-actuated state and an actuated state, comprising: a waveguide (core, upper cladding, lower cladding) for guiding optical energy, the waveguide having an input section coupled to an intermediate section (B in Figure 2),

said intermediate section having reduced confinement of the optical energy relative to said input section as shown in Figure 1; a thermal source (heating electrode in Figure 2), disposed above said intermediate section as shown in Figure 2, for generating a temperature gradient within a portion of said intermediate section along a vertical axis thereof when said device is in said actuated state, said temperature gradient being sufficient to alter a refractive index profile within said intermediate section such that a portion of said optical energy is deflected downwardly and extracted from said intermediate section as described on pages 2556-7.

Regarding claim 2, Lee et al discloses (see Figure 1) that said intermediate section of said waveguide comprises a core and a cladding bounding said core, said core and cladding having matched thermo-optic coefficients as described on page 2557, right-hand column 30-35.

Regarding claim 3, Lee et al discloses that said core of said intermediate section has at least one transverse dimension that is significantly larger than a corresponding transverse dimension of a core of said input section as shown in Figure 1.

Regarding claim 4, Lee et al discloses that said intermediate section is coupled to said input section by an adiabatic taper as shown in Figure 1 and as described in page 2556, right-hand column, lines 26-35 and page 2557, left-hand column, lines 1-4.

Regarding claim 5, Lee et al discloses that said waveguide further comprises an output section optically coupled to said intermediate section, said output section having increased confinement of the optical energy relative to said intermediate section as shown in Figure 1.

Regarding claim 6, Lee et al discloses that said core is segmented as shown in Figure 1.

Regarding claim 10, Lee et al discloses that said portion of said optical energy extracted from said intermediate section is adjusted by varying an electrical control signal applied to said thermal source as described in page 2557, left-hand column, lines 1-43.

Regarding claim 11, Lee et al discloses that said core and said cladding are formed from polymeric materials as described in the abstract.

In regard to claim 12, Lee et al discloses (see Figures 1 and 2) a method for controllably removing optical energy from a waveguide, comprising the steps of: (a) directing said optical energy from an input section of said waveguide to an intermediate section (tapered sections) of said waveguide as shown in Figure 1, said intermediate section having reduced confinement of said optical energy relative to said input section; and (b) generating a vertical temperature gradient (see heating electrode) within said intermediate section sufficient to alter a refractive index profile within said intermediate section such that a portion of said optical energy is deflected downwardly and extracted from said intermediate section as described in page 2557.

6. Claims 13, 14, 17, 18 and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Veldhuis et al U.S. Patent 6,377,716.

In regard to claim 13, Veldhuis et al discloses (see Figure 1) an optical attenuator device selectively operable in an actuated state and a non-actuated state, comprising: a core (core polymer); a lower cladding layer (SiON) downwardly bounding said core; a

first upper cladding sublayer (background polymer) upwardly and laterally bounding said core, wherein said core, said lower cladding layer and said first upper cladding sublayer have matched thermo-optic coefficients as described in column 3, lines 59-63; a second upper cladding sublayer (low-polymer) upwardly adjacent to said first upper cladding sublayer and having a refractive index substantially lower than the refractive index of said first upper cladding sublayer as shown in Figure 1; and a resistive heater (AU) positioned above said core, said resistive heater being configured to generate a thermal gradient within said core, when said attenuator device is in the actuated state, such that the refractive index of a portion of said core is decreased below the refractive index of a portion of said lower cladding layer located downwardly adjacent to said core, causing a portion of the optical energy traveling along said core to be deflected downwardly and extracted from said core as described in column 4, lines 13-16 and column 5, lines 45-50.

Regarding claim 14, Veldhuis et al discloses (see Figure 1) (SiO_2) a substrate affixed to said lower cladding layer.

Regarding claim 17, Veldhuis et al discloses that said core, said lower cladding layer, said first upper cladding sublayer, and said second upper cladding sublayer all comprise polymeric materials as described in column 4, lines 55-67.

Regarding claim 18, Veldhuis et al discloses that said portion of said optical energy extracted from core is adjusted by varying an electrical control signal applied to said resistive heater as described in column 5, lines 45-50 and column 6, lines 34-67.

Regarding claim 22, Veldhuis et al discloses that the portion of optical energy extracted from said core may be varied in a range between around 0% to around 99.9% as described in column 4, lines 14-24.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Veldhuis et al U.S. Patent 6,377,716 in view of Hoekstra U.S. Patent 6,408,126.

Regarding claim 15, Veldhuis et al teaches the invention as set forth above but does not teach an adhesion layer interposed between said substrate and said lower cladding layer.

Hoekstra et al does teach an adhesion layer interposed between said substrate and said lower cladding layer as described in column 2, lines 8-11.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to interpose an adhesive layer between the substrate and the cladding layer as taught by Hoekstra in the device of Veldhuis et al in order to firmly bond the substrate and cladding layer more securely.

9. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Narayanan et al U.S. Patent 5,796,906 in view of Official Notice.

In regard to claim 23, Narayanan et al teaches (see Figures 1, 2, 6) an optical attenuator selectively operable in an actuated and a non-actuated state, comprising: a core bound by a cladding (5), said core and said cladding having matched thermo-optic coefficients, said cladding having an upper surface; a thermal source (210) positioned above said core, said thermal source being configured, when said attenuator is in the actuated state, to generate a thermal gradient within said core such that the refractive index of a portion of said core is decreased below the refractive index of a portion of said cladding located downwardly adjacent to said core, causing a portion of optical energy traveling along said core to be deflected downwardly and extracted from said core; and a cover plate affixed to said upper surface of said cladding and being held in vertically spaced apart relation with respect to said cladding. Although the prior art does not specifically disclose the claimed core and cladding and that they have matched thermo-optic coefficients, this feature is seen to be an inherent teaching of that device since a waveguide necessarily includes a core and a cladding and it is apparent that they must have matched thermo-optic coefficients in order for the device to function as intended.

However, Narayanan et al does not teach that a cover plate is affixed to cladding and held in vertically spaced apart relationship with respect to said cladding and that said cover plate is affixed to said cladding by an adhesive applied to areas of said cladding away from said thermal source such that said thermal source is not contacted by either said adhesive or said cover plate.

Regarding claims 23 and 24, Official Notice is taken that it is notoriously old and well known in the optical device art to affix cover plates and to have them spaced away from the cladding layer. It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a cover plate in the device of Narayanan et al in order to protect the device and to provide ~~for provide~~ for proper operating temperature regulation of the device.

10. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sang-Shin Lee et al. "Variable Optical Attenuator based on a Cutoff Modulator with Tapered Waveguides in Polymers" in view of Official Notice.

In regard to claim 23, Lee et al teaches (see Figures 1, 2) an optical attenuator selectively operable in an actuated and a non-actuated state, comprising: a core bound by a cladding as shown in Figure 1, said core and said cladding having matched thermo-optic coefficients as described on page 2557, right-hand column 30-35, said cladding having an upper surface; a thermal source (heating electrode) positioned above said core, said thermal source being configured, when said attenuator is in the actuated state, to generate a thermal gradient within said core such that the refractive index of a portion of said core is decreased below the refractive index of a portion of said cladding located downwardly adjacent to said core, causing a portion of optical energy traveling along said core to be deflected downwardly and extracted from said core; and a cover plate affixed to said upper surface of said cladding and being held in vertically spaced apart relation with respect to said cladding as described on pages 2556-7.

However, Lee et al does not teach that a cover plate is affixed to cladding and held in vertically spaced apart relationship with respect to said cladding and that said cover plate is affixed to said cladding by an adhesive applied to areas of said cladding away from said thermal source such that said thermal source is not contacted by either said adhesive or said cover plate.

Regarding claims 23 and 24, Official Notice is taken that it is notoriously old and well known in the optical device art to affix cover plates and to have them spaced away from the cladding layer. It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a cover plate in the device of Narayanan et al in order to protect the device and to provide ~~for provide~~ for proper operating temperature regulation of the device.

Allowable Subject Matter

11. Claims 7-9, 16 and 19-21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12. Claim 7 is allowable over the prior art for at least the reason that the prior art fails to teach or reasonably suggest, "said core has a refractive index that is less than a refractive index of a core of said input section and greater than or equal to a refractive index of said cladding" as set forth in the claimed combination.

Claim 16 is allowable over the prior art for at least the reason that the prior art fails to teach or reasonably suggest, "said adhesion layer has a refractive index which is

less than the refractive index of said substrate and greater than or equal to the refractive index of said lower cladding layer" as set forth in the claimed combination.

Claim 19 is allowable over the prior art for at least the reason that the prior art fails to teach or reasonably suggest, "said resistive heater is capable of generating an average vertical thermal gradient within said core of at least 0.53 degree C/μm" as set forth in the claimed combination.

Claim 20 is allowable over the prior art for at least the reason that the prior art fails to teach or reasonably suggest, "said resistive heater is capable of generating an average vertical thermal gradient within said core of at least 0.67.degree C/μm" as set forth in the claimed combination.

Claim 21 is allowable over the prior art for at least the reason that the prior art fails to teach or reasonably suggest, "said resistive heater is positioned no more than 5 μm above an upper boundary of said core" as set forth in the claimed combination.

The prior art of record teaches an optical attenuator with a waveguide and a thermal source for generating a temperature gradient to alter a refractive index profile of the waveguide. Furthermore, the prior art teaches that the attenuator can comprise, a core, a lower cladding, and first and second upper cladding with a resistive heater above the core in order to cause a portion of the optical energy traveling along said core to be deflected downwardly and extracted from the core. However, the prior art does not teach the refractive index relationships as claimed or that the resistive heater can generate the vertical thermal gradients as claimed or that the said resistive heater is

positioned no more than 5 μm above an upper boundary of said core and there is no motivation or teaching to modify this difference as derived.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alessandro V. Amari whose telephone number is (703) 306-0533. The examiner can normally be reached on Monday-Friday 8:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cassandra Spyrou can be reached on (703) 308-1687. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

MARK A. ROBINSON
PRIMARY EXAMINER

ava AVA
April 30, 2003